

REMARKS/ARGUMENTS

The Patent Office examines and rejects claims 1-16, 49-5, 62-79 and 81-84. Applicants amend claims 12, 63-64, 73-74 and 82. Applicants submit that no new matter is added therein as amendments to claim 12 are supported at least at paragraphs [0080] and [0087]; amendments to claims 63 and 64 are supported at least at paragraphs [0096] and [0098]; and amendments to claims 73-74 are supported at least at FIG. 14 and paragraph [0029] and [0077] of the application as filed. Applicants canceled no claims. Applicants submit additional claims 85-86 which are supported at least at paragraph [0043] of the application.

Hence, Applicants respectfully request reconsideration of the pending claims and consideration of the additional claims in view of the remarks herein.

Information Disclosure Statement

Applicants note with appreciation that the Patent Office has indicated an improper listing in the Information Disclosure Statement filed May 19, 2008. Applicants submit the proper reference in the Information Disclosure Statement filed concurrently with this response.

Double Patenting

Applicants appreciate the Patent Office's provisional obviousness-type double patenting rejection of claims 1-16, 49-58, 62-79 and 81-84 provisionally rejected over claims 15-21, 24, 31-43 and 53-60 of co-pending U.S. Patent Application No. 10/664,308. Applicants will address the provisional double patenting on issuance of one of the involved patents.

Claims Rejected under U.S.C. §112

Claims 12, 63-75 and 82 are rejected under 35 U.S.C. §112, second paragraph for various alleged unclear terms. Applicants disagree.

However, Applicants amend claim 12 and submit that, as amended, claim 12 is clear.

Applicants also amend claims 63-64 and 73-75; and submit that, as amended, those claims are clear.

Next, Applicants amend claim 82; and submit that, as amended, claim 82 is clear.

With respect to claims 65, 68 and 73, Applicants disagree that the terms "the target is rigid" are unclear. Applicants assert that upon reading the specification, especially at least paragraphs [0096] and [0098], a practitioner would understand the meaning of those terms. Finally, Applicants disagree that use of the term "deformable" in claims 74-75 is unclear, and assert that upon reading at least paragraphs [0005], [0094]-[0095] and [0098], a practitioner would understand the meaning of that term.

Claims Rejected Under 35 U.S.C. §103

The Patent Office rejects claims 1-3, 5-7, 13-14, 16, 49-58, 62, 76-77, 82 and 84 under 35 U.S.C. §103(a) as being unpatentable over U.S. Publication No. 2002/0193685 to Mate et al. (Mate) in view of U.S. Publication No. 2002/0065461 to Cosman (Cosman). Claims 4 and 83 are rejected under 35 U.S.C. §103(a) as being unpatentable over Mate in view of Cosman as applied to claim 1 above, and further in view of U.S. Patent Pub. No. 2003/0007601 to Jaffray et al. (Jaffray). Claims 8-9, 12, 78-79 and 81 are rejected under 35 U.S.C. §103(a) as being unpatentable over Mate in view of Cosman as applied to claims 6-7 above, and further in view of U.S. Patent No. 5,757,953 to Jang (Jang). Claims 10-11 are rejected under 35 U.S.C. §103(a) as unpatentable over Mate in view of Cosman and Jang as applied to claim 8 above and further in view of U.S. Patent No. 5,446,548 to Gerig et al. (Gerig). Claims 15, 63-72 and 74 are rejected under 35 U.S.C. §103(a) as being unpatentable over Mate in view of Cosman as applied to claims 1 and 14 above, and further in view of U.S. Patent No. 6,073,044 to Fitzpatrick et al. (Fitzpatrick). Claims 73 and 75 are rejected under 35 U.S.C. §103(a) as being unpatentable over Mate in view of Cosman and Fitzpatrick as applied to claim 64 above, and further in view of US Patent No. 5622187 to Carol ("Carol"). For a claim to be obvious every limitation of that claim must be taught by at least one property combined reference.

Applicants respectfully disagree with the rejection above and submit that independent claim 1 is patentable over the cited references for at least the reason that none of the references teach imaging a plurality of markers in a first and in a second imaging modality, where the markers are implanted in a body; and determining first coordinates and second coordinates as required by claim 1.

Mate teaches a primary purpose of allowing target 12 to be accurately positioned at a treatment machine isocenter so that ionizing radiation is accurately delivered to target 12 (see paragraph [0035]). Mate teaches acceptably aligning target and machine isocenters 40 and 22 for radiation delivery from source 18 to irradiate a target (see cols. 35 and 39). In Mate, the imaging is performed in real time and during treatment (see paragraphs [0035], [0037] and [0039]). Mate also teaches that the imaging is performed only by exciting markers 30 with excitation source 32 so that markers 30 resonate at a selected unique frequency and generate an underlying low energy radial-frequency magnetic signal measurable from outside body 14 by array 34 of sensors 36 (see paragraph [0036]). Thus, Mate does not teach imaging a plurality of markers in a first and in a second imaging modality, where the markers are implanted in a body; and determining first coordinates and second coordinates as required by claim 1. Moreover, Mate fails to teach the planned treatment beam isocenter and treatment beam isocenter of claim 2; the first and second imaging modalities of claim 4; the false markers of claim 12; the gantries of claim 60; the different session of claim 61; or the limitations of additional claims 82-84.

Cosman teaches percutaneously fixing a stud section to the iliac crest bone of the pelvis during treatment, so that an array of marker spheres can be attached to the stud above the surface of the skin at the time of treatment (see paragraph [0061] and Figure 3C). The markers are geometric objects to indicate position of patient location that are visible to a camera (see paragraph [0063]). Thus, the primary purpose of Cosman is to have the markers external to the skin so that they can be imaged with a camera in order to provide an optical tracking system to compare the location of the markers in images picked up a camera system to align the target where target with the isocenter of a beam (see paragraphs [0064]-[0065] and Figure 3C).

Applicants also respectfully disagree with the **Response to Arguments** section of the current Office Action, where the Patent Office states that paragraph [0067] of Cosman teaches imaging a plurality of markers in a first and in a second imaging modality, where the markers are implanted in a body; and determining first coordinates and second coordinates, as required by claim 1. Cosman only teaches imaging external markers using LINAC machine L and camera system C1 (see paragraphs [0049]-[0050]). For example, index markers, 20, 21, 23 and 24 fixed on the patient may be scanned using camera system C, however it is clear that camera system C cannot scan markers implanted in a body (see paragraphs [0034] and [0035] and FIGs. 1-2).

Alternatively, Cosman teaches that internal target positioning may be achieved by X-ray imaging, such as to visualize internal anatomy and/or radial opaque index markers palced on the skin or implanted in bones or tissue within the patient prior to treatment (see paragraph [0067]). Cosman also teaches that initial step scanning may be done to develop a treatment plan (see paragraph [0064]). However, the only markers taught or enabled in Cosman are either attached to external skin of the patient (see paragraph [0056]-[0060]), or engaged with bone B beneath the skin of patient P so that reflecting spheres 66A, 66B and 66C fixed to a shaft or stock 65 can be imaged by camera C (see paragraph [0061] and FIG. 3C).

Consequently, Cosman does not teach or motivate imaging markers implanted in a body using a first and second imaging modality as required by claim 1.

In addition, by imaging markers that reside internal to a body in two modalities as required by the claims, some embodiments described in the specification, for example, without limitation thereto, may provide one or more of: (1) the benefit of measuring radiation received by internal markers near anatomical landmarks to extrapolate the amount of radiation delivered to anatomical landmarks to minimize damage to such areas from treatment (see paragraph [0043] of the Application and new claims 85-86); (2) the benefit of determining more accurate positions of soft tissue internal body areas having internal markers situated therein to ensure that a target volume (e.g., tumor) receives sufficient radiation and that injury to the surrounding and adjacent soft tissue non-target volumes (e.g., healthy tissue) is minimized (see paragraphs [0055] and [0074] of the Application); and/or (3) the benefit of imaging internal markers left in soft tissue of the body to provide more accurate positioning of a target volume during multiple treatment sessions to account for daily treatment machine setup variation and various types of soft tissue and/or organ movement (see paragraph [0078] of the Application). Thus, the invention may have any one or any combination of the foregoing benefits. However, the references do not contemplate or enable such benefits.

Moreover, Cosman does not teach the planned treatment beam isocenter and treatment beam isocenter of claim 2; the non-marker objects of claim 12; the first modality occurs during a first treatment session, and the second imaging modality occurs during a different second treatment session of claim 58; an adjustment based on how fixed spacings are between imaged

markers implanted in a target over the course of treatment of claim 63; a rigid target of claim 73; a deformable target of claim 74; a first modality on a treatment planning machine and a second modality on a treatment machine as required by claims 82 and 84; a first modality of CT imaging kilovolt imaging, and megavolt imaging of claim 83; or measuring radiation received by the markers of additional claims 85-86. As noted above, camera system C of Cosman cannot scan markers implanted in a body (see paragraphs [0034] and [0035] and FIGs. 1-2). Hence, Cosman does not teach the above noted limitations of claims 2, 12, 58, 63, 73-74, or 82-86.

Any dependent claims not mentioned above are patentable over the cited references for at least the reasons provided above of their base claims as well as for additional limitations of dependent claims.

Hence, Applicants respectfully request withdrawal of all the rejections above for all of the claims.

Additional Claims 85-86

Applicants submitted additional claims 85-86 are patentable over the cited references for at least the reasons provided above of their base claims as well as for additional limitations of dependent claims 85-86 (e.g., such as is noted above).

CONCLUSION


In view of the foregoing, it is believed that all claims now pending patentably define the subject invention over the prior art of record and are in condition for allowance and such action is earnestly solicited at the earliest possible date.

If necessary, the Commissioner is hereby authorized in this, concurrent and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2666 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17, particularly extension of time fees.

Respectfully submitted,

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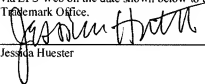


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CERTIFICATE OF TRANSMISSION

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Date